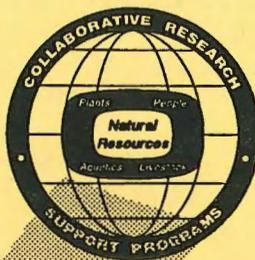


CRSP IMPACTS

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Double Impacts Result from USAID Collaborative Research

The eight dynamic Collaborative Research Support Programs sponsored by USAID are providing economic, scientific, and environmental impacts to the U.S. and 32 developing countries. These impacts far outweigh the value of contributions from their funding sources which include federal, university and LDC. Furthermore, the CRSPs have reached a stage of maturity that enables collaboration through periodic exchanges of U.S. and LDC scientists, replacing the need for U.S. technical assistance. In the past three years the CRSPs have initiated a series of economic impact studies to help each CRSP focus and concentrate on research that has high impact potential. Some of the results from these studies are listed below.

Developing Country Impacts from USAID CRSP Research

Africa

- Sorghum/Millet CRSP research has developed a breeding technique that screens sorghum varieties for resistance to *Striga*, the most devastating parasitic weed known to man. Resistant *Striga* genes are bred into improved sorghum varieties preventing loss of crops valued at one half billion U.S. dollars.

- Bean/Cowpea CRSP research helped avert a major drought related food crisis and impending famine from crop losses in Senegal through the introduction of drought resistant cowpea variety. A rate of return analysis has shown that this CRSP research generated an annual return of 63% per dollar invested, but the saving in lives is inestimable.

- Peanut CRSP microbiologists have discovered a special clay that is effective in removing aflatoxin, a deadly carcinogen, from contaminated peanut oil and peanut meal. The value of this simple and cost efficient technology is estimated in the millions and can make peanut oil, meal, and hay safe for consumption in Africa through simple application techniques.

- Nutrition CRSP scientists conducted studies in rural and semi-rural communities in Egypt and Kenya showing that reduced quantity of food intake and poor quality food result in stunted growth, impaired cognitive and behavioral development, and poor school performance of children. These conclusions are having important policy implications for food imports and child feeding programs, which are being acted on in Egypt and in California.

- Bean/Cowpea CRSP scientists have developed a low-technology solar heater which destroys all stages of the devastating cowpea weevil in stored grain. This technology has the potential of saving \$50 million annually in west Africa.
- Small Ruminant CRSP scientists have bred a dual purpose goat that produces both milk and high-quality meat in Kenya. Farmers there have been able to double their net return per animal. Economic benefits are estimated at \$10 million in increased income among 200,000 new dual goat farmers to date.
- Soil Management CRSP's long-term research in Niger is resulting in effective land rejuvenation from agroforestry-related practices generated from studies which provide information for development of agronomic production for sustainability.
- Pond Dynamics/Aquaculture CRSP research in Rwanda has led to use of technology and practices resulting in dramatic increases in the number of women practicing fish culture. This research has increased household incomes by 14% or more.
- The Peanut CRSP has developed a new peanut cultivar that yields 42% more than traditional cultivars which has resulted in increased production valued at \$600,000 annually. This represents a ten fold return on A.I.D. investment.
- Bean/Cowpea CRSP scientists in the Dominican Republic released a new improved bean cultivar, PC-50, which almost doubles total production. In 1991, over 60% of the total Dominican Republic acreage was planted in the new variety. Total annual gains from using PC-50 have been estimated at over \$5 million.
- Sorghum/Millet CRSP scientists released two sorghum varieties resistant to low pH soils resulting in over 50,000 hectares planted in 1991. The market value of production has been estimated at \$5 million.
- Tropical Soil CRSP scientists developed technology which allows the cultivation of 43 consecutive crops on jungle land where only two successive crops could be grown under typical slash and burn agriculture. This and similar methods developed in other countries has saved millions of rain forests from destruction.

Latin America

- Pond Dynamics/Aquaculture CRSP biological researchers collaborating with the private sector in studies of feeding behavior in shrimp in Honduras has developed technologies that reduce operating costs for commercial shrimp growers in feeding operations amounting to \$1 million annually.
- The Pond Dynamics/Aquaculture CRSP developed technology which greatly enhances production in Honduras. Economic benefits due to savings from land, labor and management range from \$642 to \$174 per hectare of pond surface.
- Bean/Cowpea CRSP scientists have developed a transgenic bean with resistant genes for golden mosaic in the Dominican Republic. Resistance to this virus is

now rapidly available to scientists worldwide, saving years of traditional breeding work.

- Sorghum/Millet CRSP researchers developed a package of sustainable production practices for hillside farming, using improved sorghum varieties adapted to the fragile hillsides. An economic analysis of the extended package reveals that farm income has increased 15% for those households using the new technology. Annual rate of return on investments into this technology was estimated at 32%.

Asia

- The Peanut CRSP developed technology allowing Thai village women to process and market roasted/salted peanuts in local markets and in Chiang Mai resort hotels, improving income to local village women.
- The Fisheries Stock Assessment CRSP has developed a set of methodologies that assist in measuring and quantifying the impact of environmental changes in marine resources. These methodologies are used for management of restoration of valuable living marine resources in areas with severe environmental damage, e.g., large oil spills, chemical dumps, etc.
- Pond Dynamics/Aquaculture CRSP scientists have developed efficient fertilizer strategies that yield 18,000 kg/ha per year of tilapia. This is the highest annual tilapia production ever achieved without supplemental feeds, and significantly higher than that using current methods.
- The Small Ruminant CRSP developed management techniques whereby ten sheep per hectare are used to control weeds in plantations of rubber trees. The technique reduces labor costs by 18-31%. The Government of Indonesia now saves \$51 million per year by replacing herbicides with sheep to control weeds by grazing under rubber trees on plantations.
- The Tropical Soils CRSP in Indonesia has developed technology for sustainable farming on deforested tropical land for use by over 12,000 transmigrated families settled in Sumatra. This technology provides another alternative of sedentary, sustainable farming on forest land to replace traditional destructive slash and burn farming which yields only one to two crops when nutrients are depleted and top soil eroded.
- The Stock Assessment CRSP developed a model which shows considerable natural variability in tuna stocks in Indonesian waters. The study showed that new management technology is necessary for sustained production at profitable levels.
- The Small Ruminant CRSP in Indonesia has developed a new sheep resulting in the doubling of sheep litter size. Annual increases in production of this breed in one province, with a population of 1.5 million head, offers a potential increase in income to farmers of \$18 million per year.

U.S. Economic Returns from USAID CRSP Investment

- The Sorghum and Millet CRSP has developed greenbug resistant hybrids for both the U.S. and Latin America. Total A.I.D. investment into this research over a ten year period was less than \$5 million. Economic gains to the U.S. was \$389 million in 1989 representing an annual rate of return to the research investment of 49%.
- The Peanut CRSP, in North Carolina, developed a pest management strategy that controls southern corn root worm and eliminates the use of 42,000 tons of chemicals, costing \$1 million annually, saving crops valued at a hundred million dollars annually.
- The Nutrition CRSP screened hundreds of impoverished children to identify marginal diet deficiencies and malnutrition. Thousands of affected children are now receiving proper dietary supplements in the State's child feeding programs.
- The Bean/Cowpea CRSP developed new varieties for the export markets which have increased yields, valued at \$3.7 million per year and increased income in New York, Michigan and Wisconsin.
- The Tropical Soils CRSP is providing data for the U.S. Government's program to develop prediction models for detecting global warming trends.
- Peanut CRSP research determined procedures to control a highly contagious and lethal seedborne virus introduced

from China. These techniques prevented the inevitable propagation and spread of infected seed in peanut growing states, saving crops valued at several hundred million dollars.

Host Country Enhancement

Institutional Development

The CRSP programs have made concrete contributions to development of LDC institutions through programs for advanced degree, educational programs, and through long-term, close peer guidance in scientific and integrated research collaboration. These contributions are resulting in maturing of the CRSP relationships into scientific linkages that no longer require full time assignments of U.S. scientists in many countries, in a style of collaboration that is maintained by periodic exchanges of visits of host country and U.S. scientists. The rate of return on human capital development was estimated by one CRSP at 31 percent in monetary and non-monetary benefits per year.

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